
 CARLO GAVAZZI SPACE SpA		0 CERN MIT L3 A&C/AMS AMS02-PDS			1 Doc.N°: NCR-PDS-CGS-C-128 Rev.: 1 Date: 18/12/2008 Page 1 of 2 attach: A,B,C,D,E	
		NON CONFORMANCE REPORT				
2 NCR Title: CAN BUS 01/02 CPU_RST command						
IDENTIFICATION	3 Supplier	4 Purchase Order N°	5 Model	6 Subsystem	7 Procedure/Work Item N°	
	CGS	N.A.	PFM	N.A.	N.A.	
	8 NC ITEM Identification	9 Drawing N°	10 Rev.	11 P.N. / C.I. N°	12 Serial N°	
	Can Bus I/F Board Assy	11-AMS02PDS-500.00	/	11-AMS02PDS-500.00	01 / 02	
	12 Next Higher Unit Id.	13 Drawing N°	14 Rev.	15 P.N. / C.I. N°	16 Serial N°	
	AMS02 Power Distribution System Assembly	10-AMS02PDS-000.00	/	10-AMS02 PDS - 000.00 POS 18	FM01	
DESCRIPTION	18 NON CONFORMANCE Detected During:					
	RECEIVING INSP. <input type="checkbox"/> MANUFACT. <input type="checkbox"/> ASSEMBLY/INTEGRATION <input type="checkbox"/> FINAL INSPECTION <input type="checkbox"/> TEST <input checked="" type="checkbox"/> OTHER <input type="checkbox"/>					
	19 Description of NON CONFORMANCE					
	During the PDS open box the following problem has been observed on the CAN BUS boards: When the "CPU_RST" button, present on the USCM test software, is pressed on one CAN BUS an unexpected OFF situation is found on the other CAN BUS board. Better investigation shows the presence of signals S_ON and S_OFF at the same time when the CPU_RST button is pressed.					
	17 Initiator, Dept., Date, Signature S. Alla 18-12-08					
INTERNAL NRB DISPOSITIONS	20 INTERNAL NRB Dispositions:					
	See next pages.					
	21 Verifications					
	22 Suspected cause of NC:					
	OPERATOR/PROCEDURE ERROR <input type="checkbox"/> PART <input type="checkbox"/> MATERIAL <input type="checkbox"/> PROCESS <input type="checkbox"/> TEST <input type="checkbox"/> SW <input checked="" type="checkbox"/> DESIGN <input type="checkbox"/> OTHER <input type="checkbox"/>					
	23 Classification					
	MINOR <input checked="" type="checkbox"/> MAJOR <input checked="" type="checkbox"/> Corrective/Preventive Actions: NONE					
	24 REQUEST FOR WAIVER 20/01/09					
	YES <input type="checkbox"/> NO <input checked="" type="checkbox"/> N° Analysis Required YES <input type="checkbox"/> NO <input checked="" type="checkbox"/> N°					
	27 Other related documents: NONE					
Department:		28 P.A.	29 Syst. Engineering	30 P.M.	31 C.C.	
Name:		E. Francini	S. Alla	M. OLIVIERO	C. Cinquepalmi	
Signature:		<i>[Signature]</i>	<i>[Signature]</i>	<i>[Signature]</i>	<i>[Signature]</i>	
Date:		18/12/08	18-12-08	20-01-09	18/12/08	
CUSTOMER/HIGHER LEVEL CONTRACTOR NRB DISPOSITIONS	32 CUSTOMER/HIGHER LEVEL CONTRACTOR NRB Dispositions (Class Major Only):					
	33 Finally determined Cause of NC					
	34 Corrective/Preventive Actions:					
	35 Customer/HLContractor Approval:					
	36 CLOSE OUT CERTIFICATION					
Department:		AMS Coll'd.	ARI-P.A.	AI/PM	CGS PA/QA	
Name:		Michael Capelli	E. MARCHETTI	R. R.	E. FRANCINI	
Signature:		<i>[Signature]</i>	<i>[Signature]</i>	<i>[Signature]</i>	<i>[Signature]</i>	
Date:		1 Apr 09	21 APR 2009	21 APR 2009	06/04/2009	
				 C.G.S.		



CARLO GAVAZZI SPACE SpA

0

AMS02-PDS

NON CONFORMANCE REPORT

1

N

C

R

ref

Doc.N° : NCR-PDS-CGS-C-128

Rev.: 1

Date: 18/12/2008

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CONTINUATION SHEET

<input type="checkbox"/> SUSPECTED CAUSE OF NC	<input checked="" type="checkbox"/> INTERNAL NRB DISPOSITION	<input type="checkbox"/> DESCRIPTION OF NC
<input type="checkbox"/> FINALLY DETECTED CAUSE	<input type="checkbox"/> CUSTOMER NRB DISPOSITION	<input type="checkbox"/> CORRECT/PREVENT. ACTIONS
<input type="checkbox"/> REQUIREMENTS VIOLATED		

21 Verifications

The anomaly has been found on December the 18th 2008 during open box test.
The report of the anomaly (see Annex A) has been sent to the collaboration for clarification
The same problem has been observed also on the USCM flight hardware as reported by collaboration e-mail (annex B).

CGS conclusion based on this preliminary investigation is that the identified anomaly is due to CAN bus SW.

During the verification in the stand alone setup some unwanted switch off of the can bus board has been observed. As reported in Annex D the unwanted malfunction can be related to the switching ON of the PC monitor on the table. The same malfunction has been observed also on a USCM EM board delivered to CGS some year ago for CAN BUS developing phase.

DISPOSITIONS:

-CGS request the collaboration to evaluate the anomaly and provide input.

1. The collaboration delivers to CGS new EPROM and FLASH sw (see Annex C) to be tested on the CAN BUS boards to solve the issue:

- uscm_pds_flash-20090117.hex
- uscm_pds_prom-20090117_30
- uscm_pds_prom-20090117_31

Being the issue related to CAN BUS SW this NCR is re classified as major and NRB with ASI is requested

An NRB by teleconf. has been held on 20-Jan-2009 (participant S. Alia and M. Olivier for CGS, E. Marchetti for ASI). ASI authorizes to proceed with the investigation/test with the collaboration software and to send the NCR as soon as possible.

The dispositions to be performed are:

DISPOSITIONS:"CPU RST" BUTTON:

2. To load and verify new sw (uscm_pds_flash-20090117.hex, uscm_pds_prom-20090117_30, uscm_pds_prom-20090117_31) behaviour.

New sw has been loaded and tested on both CAN BUS FM board S/N 01 and 02 successfully.
Pressing the CPU RST button on the software test the anomaly has not been reproduced anymore.
The lines S_ON and S_OFF are not commanded in high state.
The CPU RST button issue is considered solved.

UNWANTED SWITCH OFF:

For ease of traceability the issue related to unwanted switch off of the can bus board raised during the investigation described in this NCR is traced on a new NCR-PDS-CGS-C-129 issued by CGS.

3. PERFORM TELECONF NRB CGS WITH ASI
ON 26/03/2009.

1. closed 19-jan-09 see
Annex C

2. closed 20-jan-09

3. SEE ANNEX E

Problem on CAN BUS boards.

Using the "CPU RST" command , via sw I/F, on one board, the lines S_ON and S_OFF are set both to high level which is not correct.

As the OFF is “stronger” than the ON command, the other board is switched OFF.

This happens only if the lines S_ON and S_OFF are previously commanded one time.

I will attach following the procedure we used to reproduce this event.

1. PDS POWER ON

The 120V is applied to the PDS power bus.

Using the USCM SW, only a read command is sent to verify the board status.

Fig 1 shows the result: as expected the boards starts in prom and history shows Power ON (first startup).

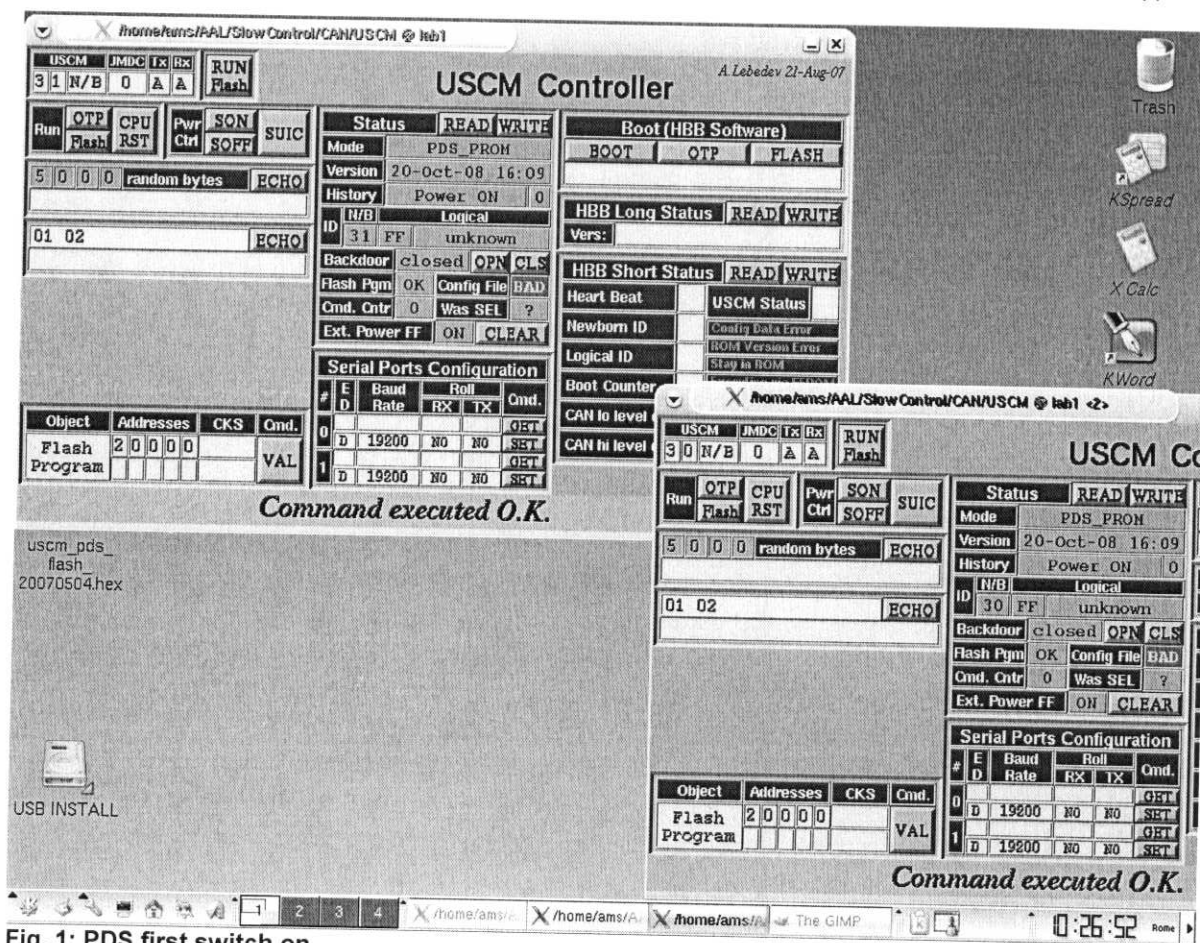


Fig. 1: PDS first switch on

2. CAN 30 switched OFF (SOFF) and ON (SON) from can 31

With this procedure the PIN of the micro interested for these command are set and commanded. The Can 30 board respond correctly and perform a power cycle OFF to ON

3. Can 31 "CPU_RST" command

Pressing the button "CPU_RST" the CAN 31 micro set the pin S_ON and the pin S_OFF (connected to relative circuit on Can 30) to high value at the same time. This correspond to found the can 30 board SWITCHED OFF.

Fig 2 shows the rising of the command lines and fig.3 shows the sw reading. After this command the CAN 31 remain in the previous condition while the CAN 30 results in OFF status.

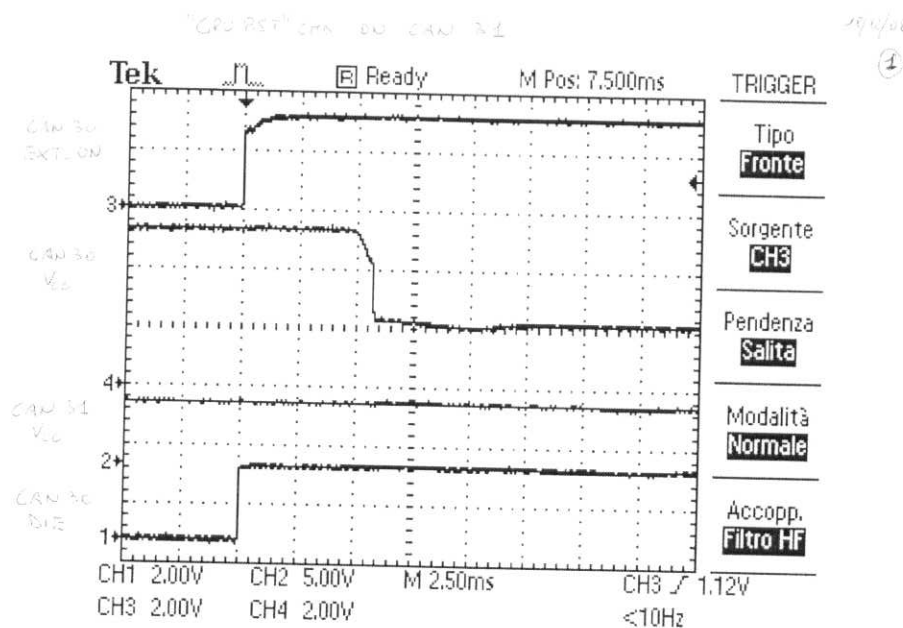


Fig. 2: CAN 30 input lines during "CPU_RST" command on can 31.

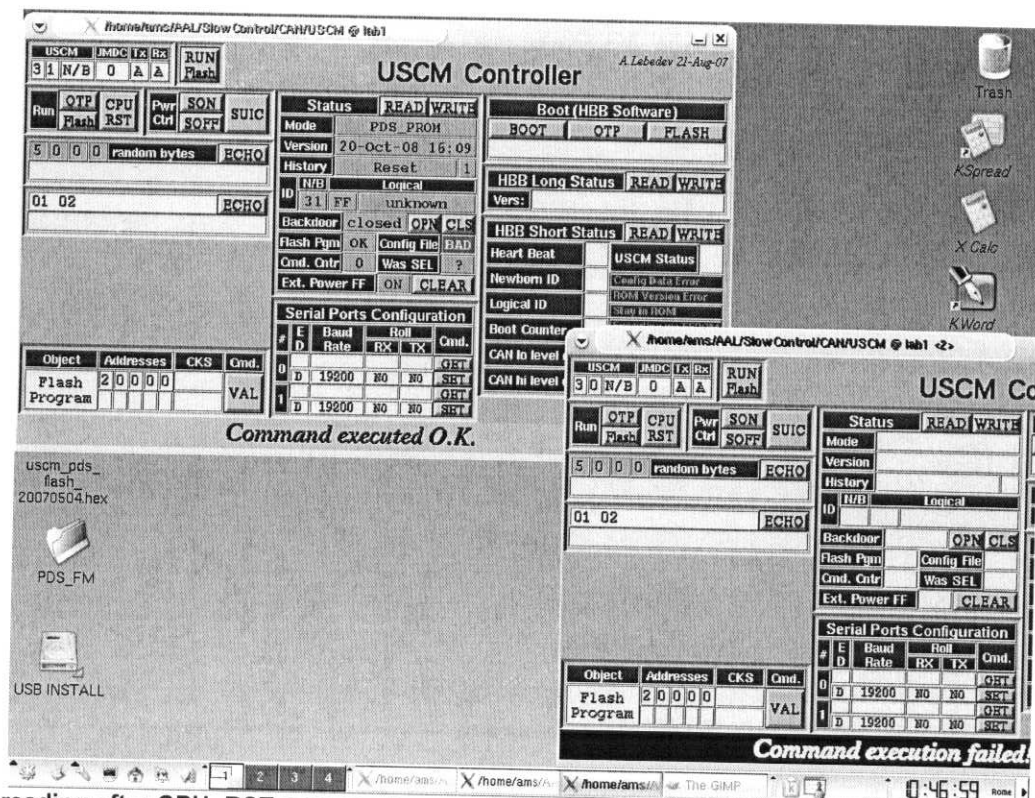


Fig. 3: reading after CPU_RST command on can 31

At this point the lines S_ON and S_OFF of can 31, corresponding to EXT_ON and DIE on can 30, remains in high value state for an indefinite time.

4. S_ON command from can 31 to 30

Sending the S_ON the can 30 remains in OFF condition. The micro output line is now reset and come back to correct ZERO value as fig.4 shows.

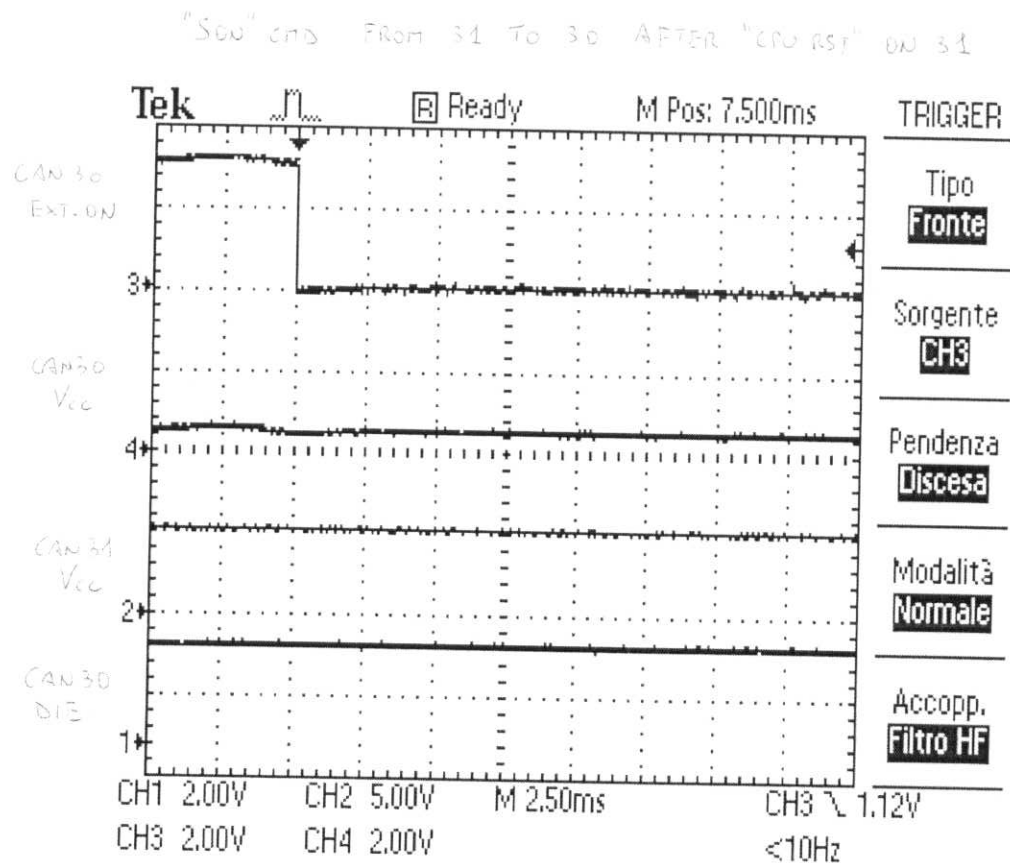


Fig. 4: S_ON command from 31 to 30 after "CPURST" command

5. S_ON command second try

A second S_ON command has been sent to verify if can 30 comes back alive. But due to the presence of the high state of the DIE line the board does not restart. Fig.5 shows this situation.

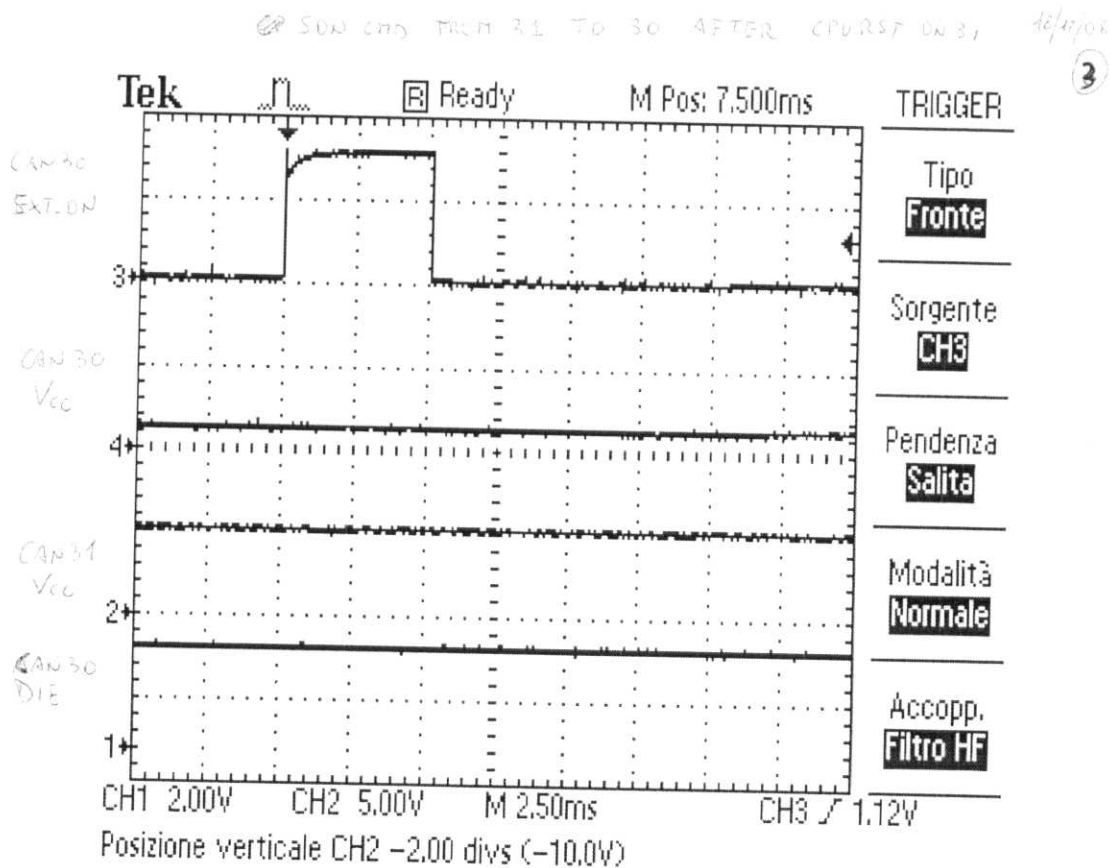


Fig. 5: S_ON command from 31 to 30 second try

6. S_OFF command from 31 to 30

The S_OFF command has been sent to reset the die line on can 30. fig.6 shows the line transition.

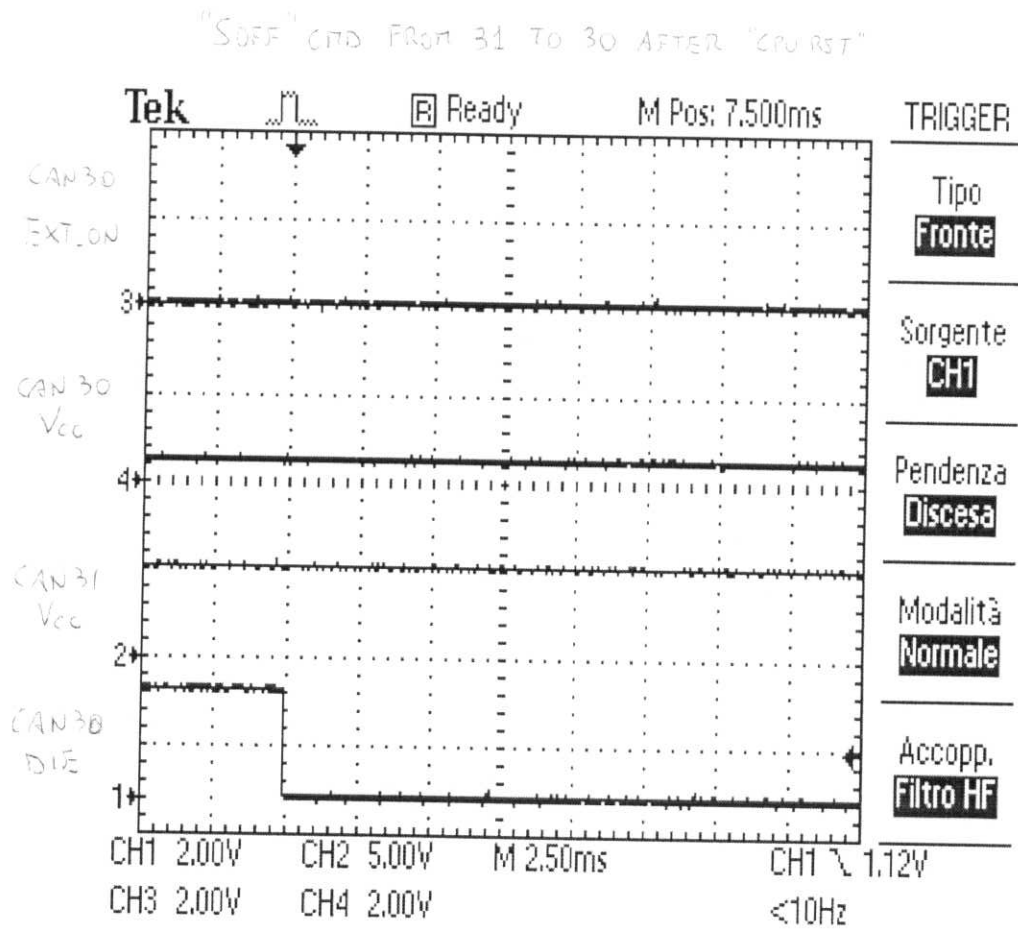


Fig. 6: S_OFF command from 31 to 30.

7. S_ON command from 31 to 30

At this point an S_ON command has been sent again to verify if can 30 comes back alive. At this time the board restarts. Fig. 7 shows line transitions while fig.8 show the sw reading.

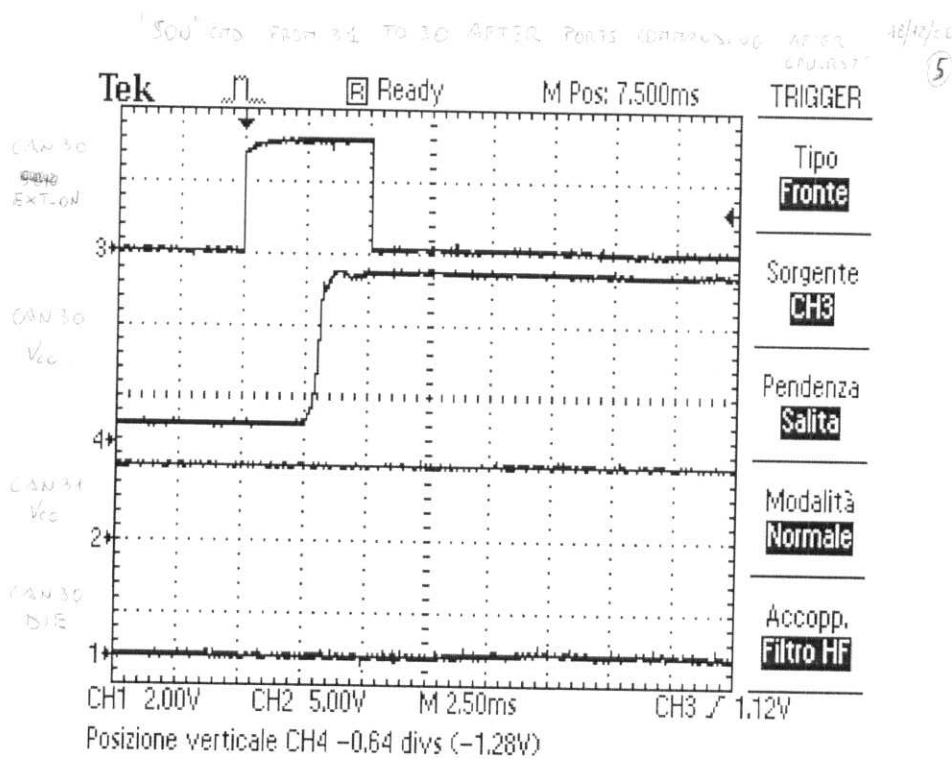


Fig. 7: S_ON command from 31 to 30 after resetting the command lines.

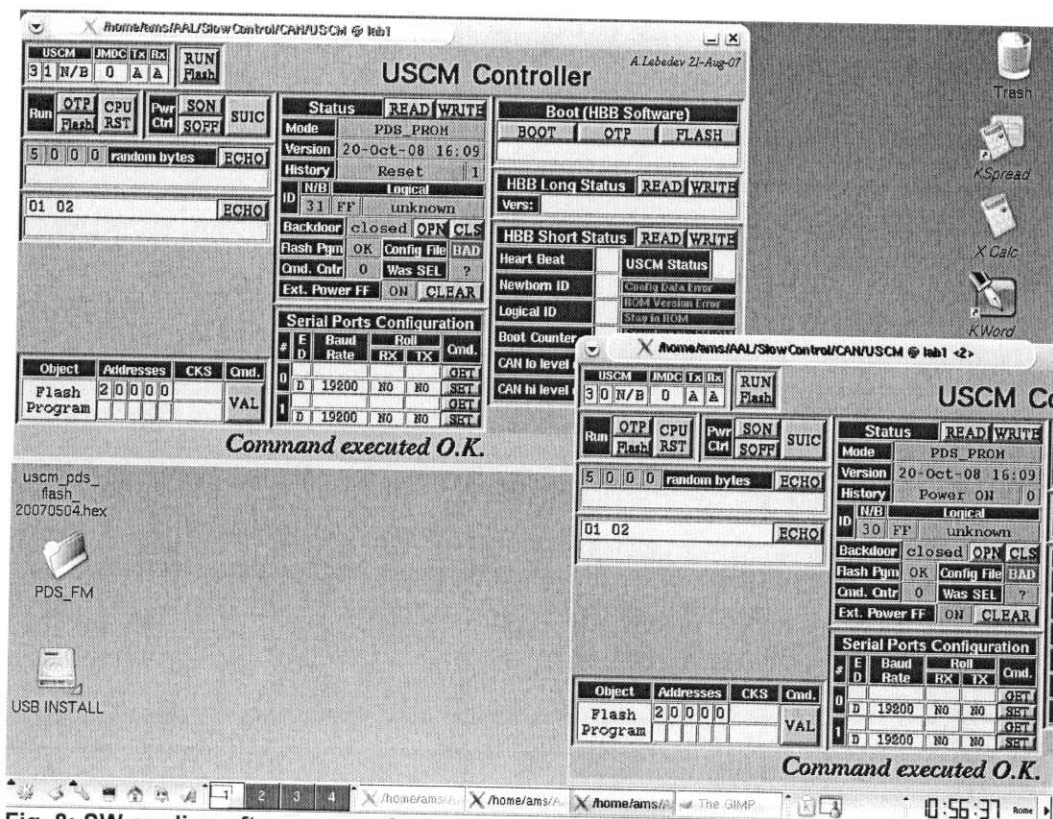


Fig. 8: SW reading after successful S_ON command from 31 to 30.

8. CONSIDERATIONS:

- The events described above are perfectly repetitive
- The same problem happens performing "CPU_RST" on can 30 corresponding to the same behaviour on the S_ON and S_OFF lines on can 31.
- The same problem happens on both board also if the micro is in flash mode.
- The problem happens if the port for S_ON and S_OFF are used one time

9. QUESTIONS

- Is this something you already notify?
- Is the micro behaviour correct?
- is what you expected during "CPU_RST" command?
- Can you please try to perform the same procedure to verify the behaviour of your boards?

Da: Alexei Lebedev [alexey.lebedev@cern.ch]
Inviato: giovedì 25 dicembre 2008 11.04
A: salia@cgspace.it
Cc: Michael.Capell@cern.ch; 'Vladimir Koutsenko'; 'Alexandre Kulemzin';
molivier@cgspace.it; rgrossi@cgspace.it
Oggetto: RE: PDS C-BUS board problems - 2

Categorie: CERN SpamKiller Note: -5

Dear Sergio,

I've tested, using your procedure, the flight software in the flight USCMs installed in the flight JPD and M-Crate mounted on the jig (radiator mockup).

To my surprise it behaves as the software you have in PDS FM (20-Oct-08), i.e. after sending commands SOFF, SON, CPU_RST to one of the USCMs the other USCM becomes off, and can be powered on back only with the command sequence SOFF, SON (sometimes I have to send this command pair twice).

The only USCM software (21-Jan-08), which behaves "correctly" is in the PDS EM CAN-BUS I/F PROM. I do not have the source of it (thank you, SXu).

My proposal is:

to leave the software as it is (use 20-Oct-08 for PDS FM) unless some new problems will be found.

The CPU_RST command is not used in our regular procedures, in fact it was added to the USCM software for "an academic completeness". And the microcontroller's instruction CPU Reset is not used in the USCM software during "reboots" intentionally to preserve the DAC settings and ADC readings.

The other problem I found (and partially already reported) is the thermal behavior of the PDS CAN-BUS I/F.

With well documented systematic studies I found that CAN-BUS I/F 30 stops working when its Dallas sensor readout reaches 36.5C. The CAN-BUS IF 31 is in the empty PDS side B and works all the time. This should be carefully tested with PDS FM.

Regards,
Alexei.

> -----Original Message-----
> From: salia@cgspace.it [mailto:salia@cgspace.it]
> Sent: Wednesday, December 24, 2008 21:24
> To: alexey.lebedev@cern.ch
> Cc: salia@cgspace.it
> Subject: RE: PDS C-BUS board problems
>
> Dear Alexei,
>
> thanks for your help. I hope you can solve this problem.
>
> Also CGS is closed for xmas up to the 6th of january.
>
> A wish you marry christmas and a happy new year.
>
> Ciao
>
> Sergio
>
>

> > Dear Sergio,
> >
> > I ran your procedure on EM PDS we have here.
> >
> > The software versions in both CAN-BUS I/F (30 and 31) are:
> > PROM: 21-Jan-08
> > Flash: 14-Feb-08
> >
> > This is different from software version you are using (20-Oct-08).
> >
> > My result:
> >
> > 1. PROM version (21-Jan-08) works as it should,
> > i.e. CPU RST does not affect on SON SOFF at all.
> > 2. Flash version (14-Feb-08) works like in your PDS,
> > i.e. CPU RST after SOFF/SON switches off the other CPU,
> > and this may be fixed only by SOFF/SON, not by a SON alone.
> > 3. I've loaded the latest software version 20-Oct-08 in the
> > Flash memory of CAN-BUS I/F 30, and it also works as in your
> > PDS.
> > 4. I've loaded the latest software version 20-Oct-08 in my USCM
> > test setup, and it also works as in your PDS (i.e. incorrectly).
> >
> > My plan:
> > 1. I will work with my USCM test setup during x-mas vacations,
> > trying to find the reason of misbehavior and fix it.
> > 2. As soon as the software will be fixed, I'll send you the
> > updated version.
> >
> > Note:
> > CERN is closed for x-mas vacations and many necessary people are
> > absent till 05-Jan-09.
> >
> > Regards and Merry Christmas,
> > Alexei.
> >
> >> -----Original Message-----
> >> From: Sergio Alia [mailto:salia@cgspace.it]
> >> Sent: Thursday, December 18, 2008 18:03
> >> To: alexey.lebedev@cern.ch
> >> Cc: Michael.Capell@cern.ch; 'Vladimir Koutsenko'; 'Alexandre
> >> Kulemzin'; molivier@cgspace.it; rgrossi@cgspace.it
> >> Subject: R: PDS C-BUS board problems
> >>
> >> Alexei,
> >>
> >> considering the problem you encountered and as preliminary
> >> step before
> >> performing a thermal verification as you suggested, we have better
> >> analysed the behaviour of the can bus board with respect to the S_ON
> >> and S_OFF
> >> commands (up to now only functionally checked)
> >>
> >> in the attached file you will find the description of a malfunction
> >> we found and that we can not solve on our own.
> >>
> >> Before continuing with temperature testing we would like
> >> to clear this
> >> problem.
> >>
> >> This could be somehow related to the EM behaviour you have even if
> >> a strong relation is not evident (maybe something is causing a
> >> "CPU_RST" or a "fixed "OFF" command).
> >>

> >> Looking forward to receiving you feedback.
> >>
> >> Thankyou
> >>
> >> Regards
> >>
> >> Sergio
> >>
> >>
> >>
> >> -----Messaggio originale-----
> >> Da: Alexei Lebedev [mailto:alexey.lebedev@cern.ch]
> >> Inviato: domenica 14 dicembre 2008 16.55
> >> A: Sergio Alia
> >> Cc: Michael.Capell@cern.ch; 'Vladimir Koutsenko';
> >> 'Alexandre Kulemzin'
> >> Oggetto: PDS C-BUS board problems
> >>
> >> Dear Sergio,
> >>
> >> I am working hard on CAB software.
> >> CAB is powered via PDS EM you kindly gave us after magnetic tests
> >> at CERN
> >>
> >> I found that after 30mins-few hours the CPU on the C-BUS board 30
> >> hangs, C-BUS board 31 is still working and can control PDS.
> >>
> >> Manipulating with SOFF/SON from C-BUS 31 sometime helps, sometime -
> >> does not.
> >>
> >> Experts proposed the C-BUS board 30 sitting in the populated side
> >> of PDS may get hot. Today I started temperature monitoring and
> >> found the C-BUS board 30 goes off at about 35 degree C.
> >> I do not know where exactly the Dallas sensor is on the
> >> board, but the
> >> temperature is not so high.
> >>
> >> I should say, I was very surprised the 8 NOP commands
> >> inserted in the
> >> initializing procedure helped (when I sent you the new software few
> >> month ago). I think the problem is not in unstable power of CPU,
> >> but in the
> >> oscillator. Vladimir looked on the oscillograms you sent us and
> >> also thinks there is something wrong with oscillator.
> >>
> >> Mike suggested you should test very carefully the C-BUS FM
> >> boards at
> >> different temperatures.
> >>
> >> Thank you,
> >> Best regards,
> >> Alexei.
> >>
> >>
> >>
> >
> >
>
>
>

Da: Alexei Lebedev [alexey.lebedev@cern.ch]
Inviato: lunedì 19 gennaio 2009 8.31
A: salia@cgspace.it
Cc: Michael.Capell@cern.ch; 'Vladimir Koutsenko'; 'Alexandre Kulemzin';
molivier@cgspace.it; rgrossi@cgspace.it; 'Andrey Rozhkov'
Oggetto: PDS C-BUS board problems with CPU RST solved (?)

Categorie: CERN SpamKiller Note: -5
Allegati: uscm_pds_prom-20090117_30.bin; uscm_pds_prom-20090117_31.bin;
uscm_pds_flash-20090117.hex

Dear Sergio,

1. Following your request I was working hard and seems to solve the CPU RST problem. Please find attached PROM programs for PDS C-BUS boards 30 and 31. The program file for FLASH is also attached (use commands:

```
load uscm_pds_flash-20090117.hex 130  
load uscm_pds_flash-20090117.hex 131
```

to load the file into the flash memory).

2. Systematic studies of PDS EM C-BUS board 30 showed that the CPU hangs when reaching the temperature 30-32C. With SOFF/SON it can be sometimes restarted, but works for few seconds only.

With the kindest regards,
Alexei.

Sergio Alia

Da: Sergio Alia [salia@cgspace.it]
Inviato: lunedì 19 gennaio 2009 19.36
A: 'alexey.lebedev@cern.ch'
Cc: 'Michael.Capell@cern.ch'; 'Vladimir Koutsenko'; 'Alexandre Kulemzin'; 'molivier@cgspace.it'; 'rgrossi@cgspace.it'; 'Andrey Rozhkov'
Oggetto: R: PDS C-BUS board problems with CPU_RST solved (?)
Categorie: CERN SpamKiller Note: -5

Dear Alexei,

To verify the new sw, dedicated test has been performed today. To simplify the procedure and get rid of possible temperature effect caused by other boards, only the two can bus boards have been supplied by external power supply (without PDS box) and connected to the PC through EPP CAN box.

Here are the results:

- we tested the FLASH sw: OK (the CPU_RST command now does not cause unexpected commands on the S_ON and S_OFF lines, and the other board stay alive)
- the PROM sw will be tested tomorrow (no PROM programmer available today)!

During the verification an unwanted switch OFF and ON of the pc monitor caused the unexpected switch off of one board.

Checking the switched off board signals the S_ON and S_OFF lines have been found in permanent high value, as observed during CPU_RST command with the old sw.

As already tested with CPU_RST command in the old sw the S_ON/S_OFF/S_ON procedure will reset this situation, switching on the affected board .

Trying to understand this problem we discovered that we can switch off one off the board cycling OFF/ON the monitor and restore it with the S_ON/S_OFF/S_ON procedure.

We found an old USCM board in our stock (it was delivered to us by Commichau about 5 year ago for CAN BUS board design purpose) and we repeated the same test on this board. Surprisingly the same behaviour has been observed: S_ON and S_OFF have been found in permanent high value after pc monitor power cycling.

It seems that the design in general is sensible to external noise and maybe for this reason some times the boards are found in OFF state.

This new setup has highlighted a possible design marginality (susceptibility to external noise) that required to be investigated and solved.

We therefore ask your support in the investigation phase since the design has been inherited by USCM modules which also shows the same behaviour.

I will contact you tomorrow to provide with further details.

Regards

28/01/2009

ANNEX E TO NCR-PDS-CGS-C-128
1/1

Da: Mike Capell [mailto:Michael.Capell@cern.ch]

Inviato: venerdì 27 marzo 2009 15.54

A: molivier@cgspace.it; Marchetti Ernesto; salia@cgspace.it; efrancini@cgspace.it

Cc: rgrossi@cgspace.it; plorenzi@cgspace.it; mmolina@cgspace.it; r.battiston@tiscali.it; Russo Enrico

Oggetto: RE: PDS NRB for NCR-PDS-CGS-C-128(M)-129(M)-131(M)-133(M) MINUTE WITH ACTIONS

Max,

For NCR-120, -128, -129, OK, I am ready to sign.

For NCR-131, -133, I confirm: No impact at system level. I am also ready to sign these NCRs.

-Mike.

Mike Capell +41 22 767 4706

From: Massimiliano Olivier [mailto:molivier@cgspace.it]

Sent: Friday, 27 March 2009 10:53

To: molivier@cgspace.it; Mike Capell; 'Marchetti Ernesto'; salia@cgspace.it; efrancini@cgspace.it

Cc: rgrossi@cgspace.it; plorenzi@cgspace.it; mmolina@cgspace.it; r.battiston@tiscali.it; 'Russo Enrico'

Subject: PDS NRB for NCR-PDS-CGS-C-128(M)-129(M)-131(M)-133(M) MINUTE WITH ACTIONS

Dear All,

In the following the decision and actions are proposed by CGS and ASI during the NRB:

NCR-120: Ncr needs only formal closure. CGS to collect signatures from AMS and ASI

NCR-128: Ncr needs only formal closure. CGS to collect signatures from AMS and ASI

NCR-129: Ncr needs only formal closure. CGS to collect signatures from AMS and ASI

NCR-131: AMS to confirm that the proposed NCR closure do not impact the AMS functionality at system level.
Upon positive AMS confirmation the NCR shall be closed without a waiver .

NCR-133:AMS to confirm that the proposed NCR closure do not impact the AMS functionality at system level.
Upon positive AMS confirmation

A DCN shall be issued to modify the requirement values in the PDS specification and the NCR shall be closed without a waiver .

We kindly ask Mr. Capell, that could not attend the telecom due to a last minute urgency, to review and reply to the proposal so that we can proceed with actions on our side.

Best Regards

Massimiliano